
# Environment, Health and Safety Division

# Integrated Functional Appraisal of the Life Sciences Division

FY 2002

Final Report
August 2002

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## Executive Summary

An Integrated Functional Appraisal (IFA) was performed for the Life Sciences Division (LSD) between April and July 2002. The purpose of the IFA was to:

(1) Verify that potential hazards are identified and controlled in formal authorization and other working areas,
(2) Evaluate new activities initiated in the Life Sciences Division since the last IFA in 1998,
(3) Fulfill the requirements of LBNL self-assessment, and
(4) Raise the awareness of line management's responsibility for safety.

The 2002 LSD IFA team consisted of EH&S subject matter specialists, the Division Safety Coordinator, and representatives of each working group. The DOE Berkeley Site Office (BSO) was invited to observe the appraisal process as part of Berkeley Lab's operational awareness program. The IFA team conducted approximately ten field appraisals, many personal interviews between April and June, and some follow-up visits in June and July. The IFA team found the following useful for determining the extent of the field evaluation scope:

- Division records,
  - Supervisor Accident Analysis Reports,
  - Formal Work Authorizations (including Radiological Work Authorization (RWAs), Activity Hazard Documents (AHDs), and hazardous waste Satellite Accumulation Areas (SAAs)) and their performance records,
- Division Safety Coordinator interviews, and
- 2001 Self-Assessment report and Management Environment, Safety, and Health (MESH) review report review.

The following laboratories and office areas were appraised during April, May, and June 2002:

- Sub-cellular Structure Cholesterol and other Research programs at Building 1, Donner Hall,
- Center for Functional Imaging at Buildings 55 and 56,
- Drosophila Genome Research Program at Building 64,
- Radiation, Cancer and other Research Programs at Buildings 70A, 74, 80, and 83, and
- Human Genome Research Program and other research programs at Building 84.

Overall, 32 RWAs, eleven AHDs, more than 60 waste storage areas (hazardous waste SAAs, mixed waste SAAs, and Radiological Material

Areas or RMAs) were assessed, as well as more than 50 working laboratories and other associated rooms. A summary of the observations, noteworthy practices, and recommendations is highlighted below. The results of the field appraisal are presented in the appendix, including the corrective actions that are currently being taken.

**EH&S Observations**

- Seismic Safety Seismic tie-down of tall equipment items (such as freezers, refrigerators, incubators, or cabinets) in laboratories has improved greatly since the last IFA, conducted in 1998. However, the IFA team found five instances in several laboratories (due to new projects or new locations) that still have equipment that needs to be anchored. In several laboratories, we also found unsecured items (such as boxes, documents, containers, or electronic devices) stored on the top of shelves or tall equipment items.
- Electrical Safety Nine laboratories were identified that have fume hoods of metallic construction or with receptacles near sinks that should be replaced with ground fault circuit interruption (GFCI) receptacles to prevent electrical shock. (Note that this is an Institutional Finding, as chemical fume hoods and their plumbing and electrical service systems electrical are a part of the building infrastructure).
- Compressed Gas Safety Researchers in several laboratories must install pressure relief devices onto their compressed gas systems. (Note: Lack of pressure relief devices is an institution-wide concern.) There were three instances where double chains or plate retainers must be added to secure a gas cylinder.
- Computer Workstation Ergonomic Safety Three laboratories were identified where employees normally work more than 4 hours a day at their computer workstations. Computer workstation ergonomic evaluations should be performed in these cases.
- Laboratory Workstation Ergonomic Safety Due to several pipetting-related injuries that occurred in the past year, the Division, with assistance from EH&S professionals, conducted several ergonomic workshops on pipetting. The most recent one was held in early June 2002. New pipetting instruments, tools, devices, and practices were introduced to most of the researchers.
- Injury Rate Between July 1, 2001, and June 30, 2002, the Division had seven recordable injury cases (yellow rating in the self-assessment report) and two lost work cases (green rating in the self-assessment report).
- Chemical Safety From the field appraisals, we found that most Division chemicals were (a) properly labeled with barcode stickers and

(b) segregated properly according to their hazard categories. However, exceptions were found in four laboratories.

- Waste Management SAA/RMA self-assessment results for FY 2002 indicated that the Division had over a 96% compliance rate. There was one NCAR for a radioactive dry waste that failed QA analysis (hazardous waste found in a low-level radioactive dry waste bag). The Division also has a waste minimization program for hazardous, radioactive, and mixed wastes that is well supported by line management.
- Radiation Safety The field appraisals found that the Division has performed their radiological work properly and has followed the required safety practices in accordance with the RWAs. The radiation safety issues have been further emphasized throughout the Division since a $^{32}$P-contamination incident at Building 1 in early 2002.
- General Safety In seven laboratories, access to the electrical panels or eyewash/safety showers was limited due to blockage by other items. In Building 1, some eyewash/safety showers apparently were either not inspected by others regularly or these inspections were not properly registered on the certification tag after inspection. This poses safety concerns (such as contamination by microorganisms).

**Noteworthy Performance**

- The Division has an active and effective safety committee that meets regularly and focuses on ES&H issues that affect the Division. Communications among the committee members, the Safety Coordinator, and line management are very effective.
- The Division has a high compliance rate for waste management and a very active waste minimization program.
- Researchers interviewed in laboratories are aware of and actively involved in EH&S issues and activities.

Overall, the Life Sciences Division has a very effective safety program, and line management is very supportive of EH&S issues. The Division is also committed to further improvement.

## Integrated Functional Appraisal Report

### Appraisal Objectives

The objectives of Integrated Functional Appraisal (IFA) are to:

- Carry out effective interdisciplinary EH&S reviews and inspections of Laboratory organizations,
- Evaluate the hazards and controls that exist in each division,
- Identify sources of risk, and provide recommendations for improvement,
- Establish baseline data from which subsequent hazard evaluations can be conducted,
- Provide a summary of findings for review by Laboratory management, and
- Satisfy the requirements of the LBNL Self-Assessment Program.

The focus of the IFA effort is to conduct field appraisals of work areas associated with formal work authorizations and representative general working areas. New hazards introduced since the last IFA efforts were also examined.

### Appraisal Procedures

The IFA process for the Life Sciences Division consisted of the following steps:

- Review of existing documents, such as Activity Hazard Documents (AHDs), Radiological Work Authorization (RWA) files, and Supervisor Accident Analysis Reports (SAARs),
- Develop the appraisal scope, team, and schedule. The scope was developed based on document and data review and discussions with the Division Safety Coordinator. Team members were selected based on their technical expertise and familiarity with the working areas and the hazards being evaluated,
- Organize a preappraisal meeting with team members, including the Division Safety Coordinator,
- Inform the Division of the appraisal,
- Perform field appraisals (between April and June),
- Conduct employee interviews and some follow-up checks as necessary (in June and July),
- Present the draft results to the Division's Safety Committee (in June), and
- Finalize the IFA report.

Appraisal Scope Since the Division has 32 RWAs, 11 AHDs, more than 60 waste storage areas (hazardous waste SAAs, mixed waste SAAs, and Radiological Material Areas or RMAs), and seven recordable injury cases (with 600 employees in the Division) to date during FY 2002, it was determined that the field appraisal should cover all of the relevant working areas.

Field Appraisals Based on the scope, the appraisal team conducted field walkthroughs that covered more than 50 laboratories, rooms, and offices in 9 buildings (Buildings 1, 55, 56, 64, 70A, 74, 80, 83, and 84) of the Division.

The Division Safety Coordinator assisted in scheduling walkthroughs with laboratory personnel and accompanied the IFA team. A DOE representative was invited to participate as an observer.

**IFA Appraisal Team**

The IFA team, consisting of the following members, conducted the field appraisal for the Life Science Division.

| **Functional Area** | **Team Member** |
|---|---|
| Team Leader/Waste Management | Li-Yang Chang |
| Division Safety Coordinator | Tony Linard |
| Hazardous Chemicals | Larry McLouth |
| General Safety | Matt Kotowski/Connie Grondona |
| Radiation Safety | Jim Case/Dawn Banghart |
| Laser Safety | Ken Barat |
| DOE/BSO Representative | Cheryl Keller |

**Observation Results**

The Life Sciences Division has approximately 600 employees, students, and guests conducting a variety of experiments in eight buildings on the hill and in one building on campus.

Throughout the Division spaces visited, there were many computer workstations that have been ergonomically adjusted or improved for the users since the last IFA (1998). However, employees in several buildings (such as Buildings 1, 70A, 74, 83, and 84) appear to be at risk of developing repetitive motion injuries while using pipettes in confined fume hoods or on benches. Due to several pipetting-related injuries in the past years, the Division, with assistance from EH&S professionals, has conducted several ergonomic-corrected pipetting workshops. The most recent one was performed in early June 2002.

Compressed gas systems in two buildings did not have the required pressure relief devices. A pressure relief device should be equipped on each compressed gas system to protect against possible system failure.

The IFA team also observed five seismic deficiencies in several buildings (Buildings 1, 55, 70A, 64, and 84). Seismic tie-down of tall equipment (such as freezers, refrigerators, incubators, or cabinets) in laboratories has been greatly improved since the 1998 IFA, however, several laboratories (due to new projects or new locations) still have equipment and instruments that need to be anchored. In several laboratories, the team also found unsecured items (such as boxes, documents, containers, or electronic devices) stored on the top of shelves or on top of tall pieces of equipment.

In seven laboratories, access to electrical panels or eyewash/safety showers was limited because they were blocked by other items. In Building 1, some eyewash/safety showers were either not inspected by others regularly or these inspections were not registered properly on the certification tag. This can pose a microorganism contamination concern.

From the field appraisals, we found that most Division chemicals were properly labeled, had barcode stickers, and were segregated properly according to their hazard categories. However, there were four laboratories where some containers were missing labels or bar codes.

Nine laboratories were found that have receptacles in fume hoods constructed with metallic materials or receptacles near sinks that should be replaced with ground fault circuit interrupter (GFCI) receptacles to prevent potential electrical shock. (Note that this is an Institutional Finding, as chemical fume hoods and their service systems, such as, plumbing and electrical, are a part of the building infrastructure).

The field appraisals found that the Division has performed their radiological work in accordance with required safety practices and in compliance with their RWAs. Radiation safety issues have been strongly emphasized throughout the Division since a $^{32}$P-contamination incident at Building 1 in early 2002.

The Division has a better than 96% waste management compliance rate (SAAs, mixed waste SAAs, RMAs). There was one NCAR, for a radioactive dry waste that failed QA analysis (hazardous waste found in a low-level radioactive dry waste bag) in FY 2002. Additional line management attention and better communication between researchers and waste management specialists was needed in this case.

**Noteworthy Performance**

The following noteworthy performance was observed:

- The Division has an active and effective safety committee that meets regularly and focuses on ES&H issues that affect the Division. Communication among the committee members, the Safety Coordinator, and line management is very efficient.
- The Division has a high compliance rate for waste management and a very active waste minimization program.

- Researchers interviewed in laboratories are aware of, and actively involved in, EH&S issues and activities (Researchers frequently discuss ES&H issues and sometimes involve EH&S professionals in their group meetings). Researchers also send representatives to LSD's safety committee and participate regularly in these meetings. They also have a very active waste minimization program for their mixed/rad/hazardous/biohazardous wastes. The researchers demonstrate commitment to ISM.

**Recommendations on Key Observations**

Several recommendations are proposed to the Division based on some key observations:

(1) Researchers (especially principle investigators) should purchase low force or electronic/automatic pipettes to reduce or eliminate pipetting-related injuries,

(2) Seismic tie-down of tall equipment (such as freezers, refrigerators, incubators, or cabinets) in several laboratories should be implemented,

(3) Items stored on shelves or on top of tall instruments or cabinets should be removed or secured,

(4) In Building 1, eyewash/safety showers should be inspected regularly by others or the inspection should be registered properly on a certification tag. The Life Sciences Division and the EH&S Division need to work together to address this deficiency, and

(5) Pressure relief devices must be equipped on each compressed gas system to protect against any possible system failure.

The detail of observations and recommendations are presented in the Summary Sheets (1–3).

**Conclusions**:

The Integrated Functional Appraisal of the Life Sciences Division was completed on schedule. It identified both opportunities for improvement and noteworthy performance. Overall, the Life Sciences Division has a very effective safety program. This appraisal reviewed a number of programmatic elements that demonstrated strong line management initiative and support of Life Sciences Division as well as the broader lab institutional EH&S programs. The Division is also committed to further improvement as demonstrated by the high profile of their integrated safety management program.

## 2002 LSD IFA Summary Sheet 1

| Building | Safety Subject | Observations | Recommendations |
|---|---|---|---|
| **74** | RWA | Fine | |
| | Chemical | Chemicals must be physically separated in different storage cabinets (acid vs. flammable). | Corrected on the spot. |
| | Electrical | GFCI circuit is needed for a hood in Rm. 265. | Replace the existing circuit with GFCI (institutional finding). |
| | Ergonomic | Rm. 351 chair or cabinet may be relocated. It is very tight and may hurt legs/knees. | Further evaluation is needed. |
| | Seismic | High voltage equipment on rack is not anchored (Rm. 265). | High voltage equipment on rack must be anchored. |
| | Other | Gas cylinders are secured with single chains (Rm. 144). | Secondary chains for the lower parts of cylinders are needed. |
| **83** | RWA | Fine | |
| | Chemical | Fine | |
| | Electrical | GFCI circuits for fume hoods in Rms. 100 and 132 are needed. | Replace the existing circuit with GFCI (institutional finding). |
| | Ergonomic | Fine | |
| | Seismic | Fine | |
| | Electrical | Liquid chemicals sitting on the electrical conduit (Rm. 123) | Liquid chemicals should be removed from the conduit – corrected on the spot. |
| | Waste | A leaking pump sitting in a secondary tray – no spill to floor (Rm. 132). | Drain and repair pump and cleanup tray. |
| **84** | RWA | Fine | |
| | Chemical | Fine | |
| | Electrical | Chemicals (liquid) sitting on an electrical conduit. | Liquid Chemicals should be removed from the conduit – corrected on the spot. |
| | Ergonomic | Pipetting injury occurred while working in a fume hood. | PI should rotate employees for different assignments and purchase more ergonomic pipettes. |
| | Seismic | Trays and several other items sitting on the shelf are not secured (Rms. 153, 157, 203, and 205) | Remove those items from the top of shelf. |
| | Seismic | Several refrigerators and file cabinets are not anchored (Rms. 203 and 205). | Several refrigerators and file cabinets need to be anchored. |
| | Housekeeping and electrical | Eyewash and electrical panel were blocked by containers or instruments (Rm. 175). | Containers and instruments should be removed. |
| | Biohazard | A few biohazardous waste containers were not properly covered while not in use (Rm. 175). | Corrected on the spot. |
| | AHD | Laser Confocal microscopes in Rms. 159 and 203 are fine | |

## 2002 LSD IFA Summary Sheet 2

| Building | Subject | Observations | Recommendations |
|---|---|---|---|
| **1** | RWA | Fine | |
| **Donner** | Chemical | Fine | |
| | Electrical | GFCI circuit for fume hoods in Rms. 301, 373, 321, and 330 | Replace the existing circuit with GFCI (institutional finding). |
| | Electrical | Electric panel was blocked by containers or equipment (Rms. 322, 364). | Containers should be removed; 3-ft clearance is needed. |
| | Ergonomic | Rm. 325 ergonomic evaluation is needed for a computer workstation. | |
| | Seismic | Incubators were not anchored (Rm. 373). | Incubators must be anchored. |
| | Seismic | Materials/books on shelf are not secured (Rm. 267). | Unsecured items on the shelf must be removed or secured. |
| | Seismic | Items stored on a fridge are not secured (Rm. 373). | Items must be removed from the top of refrigerator. |
| | Seismic | LSC should not sit on a flammable material cabinet (unsecured Rm. 267). | LSC must be secured or relocated to another location. |
| | Safety | Gas cylinders are not secured (Rm. 308). | Chains are needed. |
| | Safety | Some Eyewash/safety showers were not checked every year or were checked but not recorded properly. | EH&S and the Division need to work together to resolve the concerns. |
| | Housekeeping | General housekeeping concerns (Rms. 264 and 267) | |
| **B56** | RWA | Fine | |
| | Chemical | Fine | |
| | Electrical | Electric panel was blocked by equipment (Rm. 100). | There should be a 3-ft clearance. |
| | Ergonomic | Fine | |
| | Safety | Gas cylinders were not equipped with pressure relief valves (Rms. 100/101). | Gas cylinders need pressure relief valves. |
| | AHD | Fluorine gas cylinder stored in a cabinet (Rm. 101) is fine. | |
| **B70A** | RWA | Fine | |
| | Chemical | Some containers do not have identifiers (Rms. 1105/1107/1109). | Researchers must label those containers at once. |
| | Chemical | MeOH in refrigerator should be in a flammable cabinet (Rm. 1121). | Corrected on the spot |
| | Electrical | Fine | |
| | Ergonomic | Rm. 1118 inspected; conditions are fine. | |
| | Seismic | Double-decked incubators were not anchored (Rm. 1103). | Double-decked incubators must be anchored. |
| | Housekeeping | Eyewash was blocked by a centrifuge (Rm. 1103). | Centrifuge should be relocated. |

# 2002 LSD IFA Summary Sheet 3

| Building | Subject | Observations | Recommendations |
|---|---|---|---|
| **B55** | RWA | Fine | |
| | Chemical | One chemical bottle needs to be labeled. | |
| | Electrical | GFCI receptacles needed for hoods in Rms. 208 and 214 | GFCI receptacle must be installed (Institutional finding). |
| | Ergonomic | Rm-118 computer used for data logging; no concerns | |
| | Seismic | 3 file cabinets and a refrigerator were not anchored (Rms. 129 and 125). | File cabinets and a refrigerator need to be anchored. |
| | Safety | Carpet worn out; is a hazard for walking or chair moving (Rm. 146) | Carpet should be replaced. |
| | Safety | Pressure relief devices for gas cylinders needed (Rms. 118/124). | Gas cylinders need pressure relief devices in the transfer lines. |
| | Safety | Gas cylinders were not secured with metallic chains or plate retainers (Rm. 139). | Gas cylinders need to be secured with metallic chains or plate retainers. |
| | AHD | Three gas cylinders in Rms. 208 (1) and 214 (2) need pressure relief devices (3 AHDs). These cylinders are no longer in Rm. 151. | Three gas cylinders need pressure relief devices in the transfer lines. The AHD must be updated to reflect the new locations of these cylinders. |
| | Rad | Pulse X-ray sealed/secured (Rm. 125): fine | |
| **B64** | RWA | Fine (has not been active for a year) | |
| | Chemical | A few containers do not have bar codes (Rm. 224). | Researchers need to put bar codes on those containers. |
| | Electrical | Fine | |
| | Ergonomic | Rm. 207 workstations need an evaluation. | |
| | Seismic | Ultra-low temperature freezers were not anchored (Rm. 223 and 224). | Freezers and cabinets need to be anchored. |
| | Seismic | File cabinet/fridge were not secured. | |
| | Seismic | Containers and materials stored on the top of cabinets were not secured. | Items on the top of cabinets must be secured or removed. |
| **B80** | RWA | Not applicable | |
| | Chemical | No concerns | |
| | Electrical | No concerns | |
| | Ergonomic | No concerns | |
| | Safety | Eyewash/shower was blocked by a fume hood (Rm. 214). | (Institutional finding) Either the fume hood or eyewash/shower must be relocated. |
| | Safety | Eyewash/shower in Rm. 210 was blocked by equipment. | Corrected on the spot |
| | Housekeeping | General housekeeping issues (Rm-210) | Remove all of unwanted boxes |
| | AHD | Laser systems (2 microscopes) are fine. | |